WEATHER ON THE NORTH PACIFIC OCEAN

By WILLIS E. HURD

Atmospheric pressure.—Barometric conditions were practically normal over the North Pacific Ocean during July. The only considerable local departure was at Titijima, in the Ogasawara Islands, where the average pressure, 1,014.3 millibars (29.95 inches) was 3.7 millibars (0.10 inch) above the normal of the month.

Most central and northeastern waters of the ocean were almost completely dominated by an area of high pressure which extended westward unusually far into east longitude.

A shallow depression—the Aleutian LOW—lay over Bering Sea, with average pressure of 1,008.6 millibars (29.78 inches) at Petropavlovsk. In the extreme southwestern part of the ocean, the Asiatic LOW extended seaward over the southern Archipelagos of Japan, Naha, Nansei Islands, having an average barometer of 1,006.1 millibars (29.71 inches), which is slightly lower than the normal for July.

TABLE 1.—*Averages, departures, and extremes of atmospheric pressure at sea level, North Pacific Ocean July 1940, at selected stations*

Stations	Average pressure	Departure from normal	Highest	Date	Lowest	Date
	Millibars	*Millibars*	*Millibars*		*Millibars*	
Point Barrow	1,014.1	+0.9	1,025	15	999	16
Dutch Harbor	1,012.5	−1.3	1,028	27, 28	990	19
St. Paul	1,009.6	−.9	1,028	27	989	20
Kodiak	1,015.4	+1.5	1,030	14	1,002	17
Juneau	1,015.9	−1.7	1,027	4	1,005	27
Tatoosh Island	1,018.3	+.7	1,029	2	1,008	26
San Francisco	1,015.2	+1.0	1,021	12	1,009	26
Mazatlan	1,011.7	+.5	1,017	30	1,007	2
Honolulu	1,015.9	−.7	1,020	10	1,012	29
Midway Island	1,021.3	+1.7	1,025	7, 13, 14	1,017	20, 28
Guam	1,010.0	−.5	1,014	10	1,004	8
Manila	1,007.3	+.2	1,011	21	1,002	6
Hong Kong	1,002.7	−1.4	1,009	24	993	8
Naha	1,006.1	−.3	1,015	23, 24	967	12
Titijima	1,014.3	+3.5	1,017	8, 19, 20, 22	1,003	6
Petropavlovsk	1,008.6	−1.6	1,019	26, 30	995	12

NOTE.—Data based on 1 daily observation only, except those for Juneau, Tatoosh Island, San Francisco, and Honolulu, which are based on 2 observations. Departures are computed from best available normals related to time of observations.

Extratropical cyclones and gales.—July was one of the quietest months on record, so far as extratropical cyclones are concerned, on upper waters of the North Pacific. Several low-pressure areas formed over or entered the northern part of the ocean, but they caused few high winds. The only gale of record arising from any of these disturbances was a southeast wind of force 9 reported by the American steamer *Los Angeles* near 55° N., 165° W., on the 19th. The deepest northern cyclone of the month was then centered over the Aleutians, with lowest pressure, 989 millibars (29.20 inches), occurring at St. Paul Island on the 20th.

Typhoons and other tropical cyclones.—On page 196 is an account by Rev. Bernard F. Doucette, S. J., Weather Bureau, Manila, P. I., of one depression and five typhoons that occurred during the month in the Far East. In at least two of these typhoons, those of July 6–16 and July 25–29, there were reports of hurricane velocities.

In the southeastern Pacific there were at least two tropical cyclones, in addition to suspiciously squally conditions on 2 days south of the Gulf of Tehuantepec. In these, the American steamer *Manoa* had an east gale of force 8, with slightly depressed barometer, near 15° N., 95° W., during a thunderstorm on the 4th. On the 9th, a little to the southwestward, the United States Army transport *Chateau Thierry* had an early morning gale of force 9 from the NORTHEAST.

The earlier of the two known cyclones appeared as a depression at some distance southwest of Acapulco, Mexico, on the 20th. On the 21st a few vessels experienced rough weather off the coast between Acapulco and Manzanillo, but the only gale of any severity reported was of force 10 from the southeast, encountered by the Swedish motorship *Shantung* close to 19° N., 105° W., at 8 a. m. Four hours earlier the ship's lowest barometer was read as 1,006.6 millibars (29.72 inches), wind east, force 2. On the 24th an unknown vessel reported a northeast wind of force 8, barometer 1,009 millibars (29.80 inches), near 24° N., 125° W. Thereafter the disturbance seems to have rapidly disintegrated.

The second cyclone is known through the reports of two American steamers, the *Agwidale* on the 29th, and the *Liberator* on the 30th. The *Agwidale*, Honolulu toward Balboa, encountered the highest wind, east-northeast, force 10, at 11 p. m. of the 29th, in 19°55′ N., 127°40′ W., with uncorrected barometer down to 1,001.7 millibars (29.58 inches). The *Liberator*, on the same route, had an extreme velocity of force 10 from the southeast near 7 a. m. of the 30th. At 3 a. m., in 19°36′ N., 128°30′ W., occurred the vessel's lowest barometer, 969.5 millibars (28.63 inches). The cyclone is thus seen to have been of marked intensity and to have been traveling in a west-northwest or northwest direction.

Fog.—Numerous occurrences of fog were observed from ships along the greater extent of the northern routes between the fortieth and fiftieth parallels. Between about longitudes 150° W. and 150° E., fog was reported on some 15 to 25 percent of the days, and was in some areas long-continued and dense. The most widely fogged periods were the 7th–8th and the 15th to 18th. Along the American coast the Swiftsure Bank Lightship, at the entrance to the Strait of Juan de Fuca, reported fog on 13 days. Off Oregon there were 3 days with fog in ship reports; off California, 11 days; and off Lower California, 7 days.

TYPHOONS AND DEPRESSIONS OVER THE FAR EAST

By BERNARD F. DOUCETTE, S. J.

[Weather Bureau, Manila, P. I.]

Depression, June 26–July 3, 1940.—A depression, apparently of mild intensity, formed a short distance east of Samar, moved west-northwest across the Visayan Islands, and inclined to the north when over the China Sea. It recurved to the northeast when the center reached the western part of the Balintang Channel, a course which brought the depression to the locality of southern Formosa (Taiwan). On July 1, the direction again became west-northwest and in 2 days the center reached the continent where it disappeared.

Typhoon, July 2–9, 1940.—This storm appeared about 150 miles south-southeast of Yap on July 3, moved in a northwesterly direction to the eastern part of the Balintang Channel where it inclined to the north, moving in this direction for only a day (July 6). A northwesterly course was followed July 7 and 8, and a shift to the west took place after the center crossed Formosa. No trace of the typhoon could be found July 9.

Of all the observations received during these days, the pressure at Ishigakijima, Nansei (Loochoo) Islands, was the lowest, namely, a value of 739.7 mm. (986.2 mb.) reported July 7 at 2 p. m.

Typhoon, July 6–16, 1940.—A well-developed typhoon appeared about 300 miles south of Guam, July 6, moved northwest, then west-northwest, and inclined to the north when the center reached the ocean regions about 500 miles east of northern Luzon. This northerly course soon became north-northwest, and the storm moved into the Eastern Sea, passing about 60 miles west of Naha, Nansei (Loochoo) Islands. Recurvature took place over the central part of the Eastern Sea and the center soon reached the Sea of Japan on its way to the northern Pacific Ocean.

The steamship *Coldbrook* experienced the strength of this typhoon and sent many observations to Manila on July 11 as the center passed close to and east of the ship. Of these observations, that with the lowest pressure was made at 0400 GMT (noon, Manila time), latitude 21.6° N., longitude 128.5° E., 959.0 mb. (719.3 mm.) with west-northwest winds of force 12.

The upper winds during the period of the three storms just described showed their greatest activity over the Philippines, Indochina, and Thailand from July 4 to 13 approximately. The depression late in June was a manifestation of a quiet advance of the southwesterly current from Thailand and Indochina (and very likely from the Straits Settlements, but only scattered observations are at hand at the present writing) to the Philippines and the Pacific. The approach of the typhoon, July 2 to 9, intensified this current over Cebu, Manila, Dagupan, and Aparri, velocities of 100 k. p. h. and over being reported a few times. Zamboanga, however, did not seem to feel the effect of this strength, the velocities reaching 50 k. p. h. only infrequently. The typhoon, July 6 to 16, maintained these high velocities until about July 12 or 13, after which they diminished gradually as the storm center reached the Eastern Sea. There was no special activity in the east quadrant current at Guam during these days, as far as can be ascertained from available observations.

Typhoon, July 12–25, 1940.—This storm center moved northwesterly from the ocean regions far to the south-southeast of Guam to the latitude of southern Formosa where it changed to the west. It recurved to the northeast when within 100 miles of Formosa, but followed a northerly course into the Eastern Sea. Korea (Chosen) was crossed and the typhoon rapidly moved northeast over the Sea of Japan and beyond.

Until this typhoon reached the locality of Formosa and the Eastern Sea, it did not manifest the power that it seemed to have when it passed west of Guam. Observations from Ishigakijima, Nansei (Loochoo) Islands, showed that the center was deep, but exerting its influence only nearby and not at a distance. The 2 p. m. observation of July 21, from this island station had 739.0 mm. (985.3 mb.) with east-southeast winds, force 8, as the center moved northerly along a course about 60 miles west of the station.

Typhoon, July 25–29, 1940.—Forming about 500 miles east-northeast of San Bernardino Strait, this typhoon moved in a west-northwesterly direction, and crossed Balintang Channel and the northern part of the China Sea on its way to the continent. It passed over the coast line between Hong Kong and Swatow and disappeared over the interior on July 29.

The steamship *Kujawa Maru* reported from latitude 18°20′ N., longitude 124°30′ E., a pressure of 695 mm. (926.6 mb.) with north-northeast winds of force 12, July 26, at noon. As the typhoon crossed Balintang Channel, neither Basco nor Aparri had any extremely low pressures or strong winds, indicating that the storm had weakened or was small in area.

Typhoon, July 29–August 4, 1940.—For some time before July 29, there was a low-pressure area east of the Philippines but no definite center appeared until July 29, when it was certain that a typhoon was in existence about 600 miles east of Basco. This center moved northwest, passed about 60 miles southwest of Naha and later about 60 miles northeast of Shanghai, moving in a northerly direction almost parallel to the coast line. It crossed Shantung Peninsula on August 2, but there seemed to be traces of the circulation over northern China and Manchuria on August 4.

Observations from the steamship *Hybert* indicated the existence and movement of this storm, July 29 and 30. From latitude 24°0′ N., longitude 128°0′ E., the value of 994 mb. (745.5 mm.) with west winds, force 9, was reported (July 30, 6 a. m. Manila time), this being the lowest pressure value in the series of observations from this vessel. Naha, Nansei (Loochoo) Islands, on July 30, 2 p. m. reported pressure at 743.0 mm. (990.6 mb.) with east-northeast winds, force 5. The next day at 6 a. m., the steamship *City of Norfolk*, position in latitude 28°12′ N., longitude 125°30′ E., had pressure at 973 mb. (729.8 mm.) with east-southeast winds of force 8.

The last three typhoons of the month should be characterized as small, exerting their influence over a small area. Compared with the two in the first half of the month, very little, if any of the activity which they manifested was found after July 15. Over the Philippines, the upper winds, southwest quadrant prevailing, hardly reached values above 40 k. p. h. Usually, it might be mentioned, there was an easterly current above the southwesterly current, the high clouds showing this often and the balloons entering it a few times. Thailand and Indochina pilots showed a weaker southwesterly current during the last half of the month. Guam did not have any strong east quadrant winds, and when the southwesterly current reached that locality for a few days the velocities were always weak. This month is interesting because of these two types of typhoons, the larger during the first half, the smaller during the latter half, and moving over similar courses.

RIVER STAGES AND FLOODS

By BENNETT SWENSON

During July severe flooding was confined to the Black Warrior, Tombigbee, Pearl, and Pascagoula River Basins in the East Gulf of Mexico drainage, and the lower Colorado and Guadalupe Basins in Texas. Rcord rainfall in central and southern Texas on June 29–30, ranging from 8 to 22 inches over a small area, resulted in the floods in the Texas area which were most destructive in the upper Lavaca River. In the east Gulf area rainfall was almost continuous over a much longer period, lasting from June 29 to July 20 with only a few interruptions.

East Gulf of Mexico drainage.—Moderate flooding occurred in the lower portions of the Apalachicola River, when the stage at Blountstown, Fla., exceeded flood stage by 3.5 feet on July 14. The Choctawhatchee River just reached flood stage on the 10th at Caryville, Fla.

Rains were heavy over the Black Warrior and Tombigbee Rivers on July 2 and 3, causing sharp rises on the 3d. Heavy showers occurred over the upper parts of both basins every day except one, from the 3d to the 15th. The Black Warrior at Tuscaloosa, Ala., had three rises and the upper Tombigbee at Aberdeen and Columbus, Miss., had two, during the flood period. In the lower portions

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